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Holden, R., On the relation between *Cycadites* and *Pseudocycas*. (New Phytologist. XIII. 10. p. 334—340. Dec. 1914.)

Nathorst in 1907 established the genus *Pseudocycas* for certain cycadean fronds formerly referred to the genus *Cycadites*. They differ from the latter genus in the possession of a double instead of a single midrib, and in the fact that the pinnules are not narrowed, but if anything broadened at the point of attachment to the rachis. Further the stomata are confined to the ridges formed by the double midrib and to the furrow between; the epidermal cells are in long rows, and their walls are sinuous.

In the present paper two species of *Cycadites* (*C. rectangularis* a Rhaetic species, and C. *Saportae* an English Wealden species) have been examined with special reference to the epidermal characters. It is shown that they should be transferred to the genus *Pseudocycas* since they differ from the members of that genus only in the presence of additional stomata. It has been shown by Thomas and Bancroft that there is a general cycadean type of stoma which varies but slightly in all living and fossil forms. Among the various features may be mentioned number of accessory cells, shape and size of guard cells, etc. Between extant and extinct, however, there is a further point of difference, dependent on the fact that in the former the xerophytic habit has caused an almost universal sinking of the guard cells with the consequent interposition of one or more series of intercalary cells between them and the accessory cells proper, while in the latter, at least in the Bennettitales group, the stomata open directly on the surface. On this criterion the genus *Cycadites* should be included in the Bennettitales group.

It is pointed out that the characters derived from the midrib are of no generic value for in the living species of *Cycas* the midrib is undoubtedly single yet on the upper surface it usually appears as a ridge, bounded on each side by a furrow. If such a pinnule were fossilized an impression of the upper surface would be referred to the genus *Pseudocycas* and one of the lower side to the genus *Cycadites*. It was also shown that on drying the ridge on the lower side, which in an impression would be represented by a single line, collapses down the centre, forming a groove bounded on each side by a ridge. It is suggested that the pinnules of *P. insignis, P. Saportae,* etc. have a double or a single midrib according as the impressions were made from the upper or the lower side of a fresh or a dried leaf. Thus the presence of a double or a single midrib is of no diagnostic importance.

It is urged that in the future the genus *Pseudocycas* should include those forms whose cuticles have the structures described by Nathorst, and that *Cycadites* should be retained for fronds resembling the living *Cycas* in external appearance, but whose cuticles are as yet unknown. W. B. Turrill (Kew).

Armstrong, H. E. and **H. W. Gosney.** Studies on Enzyme Action. XXII. Lipase (IV). The Correlation of Synthetic and Hydrolytic Activity. (Proc. Roy. Soc. LXXXVIII. p. 178—189. London 1914.)

The authors make a comparative study of the synthetic and hydrolytic activity of Lipase in the case of fats. Using the Tanaka preparation a series of parallel experiments was carried out to ascertain the limits within which the two opposing changes take place in presence of different proportions of the interacting substances and of water. The results are summarised graphically.

Wm. B. Brierley (Kew).

Atkins, W. B. G., Oxidases and their Inhibitors in Plants Tissues. Part IV. The Flowers of *Iris*. (Sci. Proc. Roy. Dub. Soc. XIV. 24. p. 317—327. 1915.)

The author repeats and extends his work on the peroxidase reaction of *Iris* flowers, with a view to determining how far the activities of oxidising enzymes are dependent upon various factors such as age and illumination.

There is no correlation in the distribution of peroxidase and anthocyanin, but the former is similar for related species and varieties, active peroxidase being absent from the *Pogoniris* group, variable in the *Apogon* group, and well marked in the *Xiphion* group.

Inhibitors, producing in peroxydase tests a negative result, may be removed by treatment with hydrogen cyanide as recommended by Keeble and Armstrong, or by toluene water, these agents rendering protoplasm permeable and allowing apparently of the diffusion of the inhibitor.

In many cases the quantity of active peroxidase slowly increases when *Iris* flowers are kept in darkness and in one such case the production of organic peroxide was noted.

Wm. B. Brierley (Kew).

Ball, N. G., On the Action of Pectase. (Sci. Proc. Roy. Soc. Dublin. XIV. 28. p. 349—357. 1915.)

The electrical conductivity during the coagulation of pectin was measured and found to remain practically constant shewing that a true gel is formed.

A viscosimeter of the Ostwald type was used to determine the changes in viscosity during coagulation, and experiments shewed that the activity of the enzyme is greater at 14° than at 0° C.

At first the viscosity increases slowly, then more rapidly, until a maximum is reached, this being followed by a rapid decrease. The maximum is lowered by increasing the electrolytes present and raised by decreasing them. The author considers the decrease in viscosity to be due to the action of the electrolytes in clumping together the particles of colloid forming the reticulum of the gel, so that a suspension is produced. Wm. B. Brierley (Kew).

Benjamin, M. S., A Note on the Occurrence of Urease in legume Nodules and other Plant Parts. (Proc. Roy. Soc. New South Wales IL. 7. p. 78—80. 1915.)

The presence of Urease has been determined in the root nodules of seventeen out of twenty one species of *Leguminosae* investigated. The enzyme is also present in various portions of other plants examined and in certain Algae and Lichens; in the latter case the reaction for the presence of the enzyme being particularly pronounced and rapid.

It is suggested that some correlation may exist between the presence of Urease and the processes of elaboration and interchange of nutritive material in the living plant. Wm. B. Brierley (Kew).

Bose, J. C., An Automatic Method for the Investigation of Velocity of Transmission of Excitation in *Mimosa*. (Phil. Trans. Roy. Soc. Lond. CCIV. B. 305. p. 63—97. 1913.)

The author has investigated the phenomenon of excitation in *Mimosa* and has devised a method whereby the value of the latent period and the velocity of transmission may be obtained by automatic records made by the plant itself. This is made possible by a new type of record in which the writer accurately tuned to a definite and known frequency is maintained in resonant vibration. By this device errors of friction and inertia are reduced to a minimum. The apparatus is figured and described.

Much experimental data is given which in the author's opinion "proves conclusively that the transmission of excitation in the plant is a process fundamentally similar to that which takes place in the animal, being in the one case, as in the other, a propagation of protoplasmic change". Wm. B. Brierley (Kew).

Everest, A. E., The Production of Anthocyanins of Anthocyanidins. (Proc. Roy. Soc. Lond. LXXXVII. 1. p. 444—452. 1914.)

Consideration of work on the Anthocyan pigments of plants leads the author to conclude "1) That if the Anthocyans are produced from the yellow glucosides, then it must be by some interaction

in which the glucosides and not the hydrolysed glucosides take part; and 2) that all evidence obtained in dealing with the above mentioned pigments tends to shew that the anthocyan pigments would prove to be, not oxidation but reduction products of the yellow glucosides".

Some experimental data are given in support of these views.

Wm. B. Brierley (Kew).

Everest, A. E., The Production of Anthocyanins and Anthocyanidins. (Proc. Roy. Soc. Lond. LXXXVIII. 2. p. 326—332. 1914.)

The author continues his work on the Anthocyan pigments and disputes the contention of Willstätter that the red pigments obtained by reduction of the yellow flavonal derivatives are different from the natural Anthocyans.

Of particular interest among the author's experiments supporting his views is that dealing with the pigment derived from the reduction of Rutin. Wm. B. Brierley (Kew).

Gibson, R. J. H,, Pioneer investigators of photosynthesis. (New Phytol. XIII. p. 191—205. 1914.)

In this contribution to the history of plant physiology, the author indicates various errors and omissions made by Sachs in dealing with the work done by Malpighi, Grew, Priestley, Ingenhousz, and de Saussure, and gives an extended summary of the work of the lastnamed investigator, pointing out that whereas de Saussure is often described as the last of the band of workers in plant physiology who flourished at the end of the 18th and the early years of the 19th century, it would be more correct to speak of him as the forerunner of the new school of chemical biologists represented more than a generation later by Boussingault and Liebig. F. Cavers.

Hiltner, L., Ueber die Kalkempfindlichkeit verschiedener Lupinen und anderer Pflanzenarten. (Prakt. Bl. Pflanzenbau und Pflanzenschutz. 5. p. 53—59. 1915.)

Die Kalkchlorose oder Mergelkrankheit der Lupinen ist nach Verf. nicht namentlich auf eine Schädigung der Knöllchenbakterien durch den Kalk, oder auf eine spezifische Abneigung der Pflanzen gegen Kalk, sondern vielmehr auf die schädliche Einwirkung des von den Pflanzen aufgenommenen doppelt kohlensauren Kalk zurückzuführen. Viele Lupinen-Sorten scheiden nach Untersuchungen des Verf. viel CO_2 aus, die in einem stark kalkhältigen Boden ziemlich grosse Mengen dieses Kalkes durch Umwandlung in doppeltkohlensauren Kalk in löslichen Zustand überführt. Diesen Kalk nimmt die Pflanze auf und wird dadurch geschädigt. Der gleiche Kalk bildet mit anderen Salzen stark basische Verbindungen, die die Funktion der Wurzel und damit das Wachstum der Pflanzen stark beeinträchtigen. Man bespritze die Pflanzen mit Fe-Salzen, um den schädlichen Kalkeinfluss zu beseitigen.

Matouschek (Wien).

Joly, J., A Theory of the Action of Rays on Growing Cells. (Proc. Roy. Soc. Lond. LXXXVIII. p. 262—266. 1914.)

The author draws attention to the analogy presented by the

cell and the photo-sensitive plate and assumes a real basis for the approximation of the processes, in the photostimulation of the sensitive salt and the effects of x rays on the molecular systems existing in the cell. The cancer cell is thus regarded as the seat of excessive ionisation, this however not negativing the possibility that the origin of, or predisposition towards, abnormal ionic activity may be founded in biological causes.

Wm. B. Brierley (Kew).

Jones, D. H., A Morphological and Cultural Study of some *Azotobacter*. (Proc. Trans. Roy. Soc. Canada. 3. VII. p. 43—55. 1914.)

Four strains of *Azotobacter* derived from kitchen garden-soils were isolated and their cultural reactions described. The morphology of the organism in each variety varies very considerable with age and cultural conditions and occasionally a spherical body — possibly nuclear — is present which usually divides, simultaneously and in the same plane, with cell fission. In three of the varieties capsule formation, is present. Flagella are peritrichic and of two types, the one long and delicate and apparently related to cell disintegration, the other short and more permanent in character. The *Azotobacter* pigment is apparently produced only when there is lack of suitable available nutriment on cessation of multiplication, and when the culture is aerated. Thorough aeration is essential to growth, and the thermal death point is between 55—60 $^0/_0$. The most successful staining reactions were obtained with saturated alcoholic solutions of Gentian Violet or Rosanilin Violet, Heisser's Blue, and Babe's Safranin. The author considers that the irregular packets and sarcinae forms found in mature cultures result from simple fission of the cell and are not derived from spores as described by Prazmowski. In N⁰. 2 strain the suppossed nuclear body may split up and it is considered possible that the granules may act somewhat as gonidia spores and develop after disintegration of the parent cell. If no disintegration occurs these may appear as the endospores of Prazmowski. The organisms were found to be fairly resistant to dessication but no exact measurements were made.

The work is well illustrated by forty six photomicographs.

Wm. B. Brierly (Kew).

Stiles, W. and **I. Jorgensen.** The antagonism between ions in the absorption of salts by plants. (New Phytol. XIII. p. 253—267. 1914.)

The author presents a careful summary and discussion of the work that has been done hitherto on antagonistic ion action, or the mutual hindrance to absorption produced by ions with a charge of the same sign, and the value of their summary is enhanced by the inclusion of an extensive bibliography of the subject. They point out that this antagonism is apparently a phenomenon of widespread occurrence in organic life; that antagonism appears to be limited to kations, not merely however to those generally regarded as having a nutritive value or at any rate those present in plants but also exists between unnecessary or poisonous anions like aluminium and copper and even between metals and alkaloid bases; and that the cases of antagonism observed appear to show that the effect is

greatest between ions of different valency, though not altogether absent between ions of the same valency. They regard the explanation of antagonism put forward by Szücs, based on Pauli's view of absorption, as the most plausible one. Pauli regards the plasma membrane as acting as a carrier of ions into the interior of the cell and as forming compounds with the ions, the latter entering by virtue of the reversibility of the process. Szücs, adopting this view, points out that inorganic electrolytes insoluble in lipoids can in this way enter the cell, and concludes that if there is outside the cell a mixture of salts containing two different ions, both carried in by the same radicle of the plasma membrane, these ions must naturally hinder one another's absorption, since each will combine with a part of the plasma membrane substance which would otherwise be used by the other ion if that alone were present, and thus the absorption of both ions is hindered. However, Cranner has suggested that the cell wall plays an active part by virtue of the lipoid substances which it is said to contain in addition to cellulose and pectin; and it must be left for future work to localise definitely the part which the various membranes surrounding the protoplast actually play in the phenomena of antagonism.

F. Cavers.

Bancroft, N., A contribution to our knowledge of *Rachiopteris cylindrica,* Will. (Ann. Bot. XXIX. p. 531. Oct. 1915.)

The distribution of *Rachiopteris cylindrica* appears to be restricted to the Halifax-Huddersfield area, where it occurs in the Halifax Hard Bed of Lower Coal Measure Age. It is found in the nodules of the coal seam, and its excellent preservation suggests that it was petrified more or less in situ.

The stems and their corresponding petioles are referred to two types, described as α and β respectively. α stems are characterized by a well-developed xylem strand exhibiting a marked tendency towards mesarch structure, with differentiation of the central elements; the inner and middle cortical areas have fairly thick-walled cells, while the outer cortex is composed of a few layers of thin-walled cells, suggestive of an assimilatory tissue. α petioles also have well-developed xylem strands, frequently with distinct diarch structure; their cortex is like that of α stems. β stems possess only a small monarch, centrarch xylem strand. The cortex is wide and composed of thin-walled cells; the middle area is more or less lacunar, and the outer layers of the stem seem to be of the same nature, as those of α stems. The corresponding petioles have also a wide cortex, and a reduced xylem strand which is always monarch.

Associated with stems of *R. cylindrica* are numerous small roots, diarch and typically fern-like; similar structures were also observed in various stages, arising endogenously from both α and β stems, the roots of both types being similar in structure.

In fairly constant association with the stems of *R. cylindrica* are "axes" of varying sizes, and detached sporangia similar in type to those associated with *Botryopteris ramosa, B. hirsuta,* and *B. antiqua.* The similarity of the cortex to that of α organs suggests that these axes are branches of the primary α petioles.

The occurrence of the α and β types of stems and petioles suggests three possibilities. Firstly that they represent different regions of the same plant (compare *Psilotum* and *Hottonia*); but no transition

from one form to the other has been observed. Secondly that there are two distinct though closely allied species; but the points of resemblance are too numerous to justify such a conclusion. Thirdly that the types are habitat forms of a single species and throw light on the ecology of *R. cylindrica*. The reduction of the xylem strand and its concentration, as exemplified by the presence of only one protoxylem group; the relatively wide cortex; the production of airspaces; and the absence of mechanical tissue features which characterize both stems and petioles of the β type, as compared with those of the α type — are modifications which find their parallel among waterdwelling forms of recent plants. It is therefore suggested that *R. cylindrica* was amphibious, α and β plants being respectively its land and water ecads

R. cylindrica seems to be closely related to *B. antiqua, B. ramosa,* and *B. hirsuta.* So far as the foliar trace is concerned, the four species form a progressive series from the relatively primitive *B. antiqua* to the tridentate types, *R. cylindrica* representing an intermediate term. *B. forensis* does not appear to be very closely related to this group of British species.

Concerning the nature of the primitive stele it is impossible to say with certainty whether the stele of *R. cylindrica* is more or less highly organized than those of related species. It can, however, be stated that typical steles of *R. cylindrica* show some divergence from the primitive condition, whether this is considered to be an endarch or an exarch protostele, or an asterostele.

A comparison of the methods of stem-branching and leaf-production in *R. cylindrica* provides evidence in favour of the view, suggested by Bower in 1884, that stem and leaf are homologous branches of a primitively undifferentiated and dichotomous system. Stem-branching and leaf production have been described in *R. cylindrica,* and it is evident that the two processes are essentially the same in origin. In branching, however, the completion of both branch steles is ensured by the formation of metaxylem elements below the actual level of their separation; in leaf-production, on the other hand, only the stem stele is completed in this way, for at the place of separation the leaf-trace does not appear to possess any adaxial metaxylem. A few elements may be developed higher in the petiolar trace, but at a slightly higher level still they tend to disappear again; their formation may be regarded as indicating an earlier condition similar to that seen in *B. antiqua,* in which some adaxial metaxylem is present at the level where the trace separates from the stem stele, and which is therefore still more suggestive of modified stem-branching.

This view of the origin of the leaf is further supported by the similar behaviour of the protoxylem in branching and in leaf formation. In α types, the protoxylem group of both branch- and leaf-traces divides more or less definitely; in β types, no division normally takes place in either instance. W. B. Turrill (Kew).

Holden, R., Jurassic wood from Scotland. (New Phytologist. XIV. 6 and 7. p. 205—209. June and July 1915.)

A portion of a stem, at least 75 years old, from the Corallian of Loth was sectionised and the anatomy described. The annual rings are well marked and the spring wood grades evenly into that formed in summer, indicating that the organ is a stem not a root.

In longitudinal section the wood is seen to be very simple consisting only of tracheides and rays without resin canals or wood parenchyma. The pitting of the rays is seen in radial section to be of Abietineous type. The pits of the tracheides are confined to the radial wall, where they are strictly uniseriate, and almost invariably closely compressed and flattened, i. e. the pitting here is Araucarian in character. A torus is present; trabeculae are also represented but no bars or rims of Sanio. There is a remarkable abundance of tyloses in the tracheides. The name *Metacedroxylon scoticum* is proposed for the specimen. It differs from *M. araucarioides* (*Protocedroxylon araucarioides*, Gothan), from the Upper Jurassic of Spitzbergen, only in the absence of pits on the tangential walls of the tracheides, and in the biseriate character of the rays, and it confirms the conclusion of Dr. Stopes that the plants of the Scottish Oolites belong to the same "life province" as that which included Yorkshire — and also Spitzbergen — during that period. W. B. Turrill (Kew).

Lindsey, M., The Branching and branch of *Bothrodendron*. (Ann. Bot. XXIX. p. 223—230. April 1915.)

Two new specimens of *Bothrodendron minutifolium* from the Manchester Museum are described and evidence brought forward in favour of the branch theory of the origin of the ulodendroid scar.

One of the new specimens shows branching of a type hitherto undescribed. It consists of the end of a main axis with opposite rows of alternate branches with trumpet-shaped bases. The cortex of the main stem is continuous with that of the branches, showing the branches to be attached in quite a normal way and thus disproving the umbilical attachment theory of Renier. These branches themselves show the ordinary bushy, spreading mass of small branches usual in known *Bothrodendron*.

The other specimen is a similar though larger branch which has fallen away, its clean-cut, trumpet-shaped ending suggesting that it has broken away along a definite abscission layer.

Though previously described *Bothrodendrons* in the ulodendroid condition have been attributed to *B. punctatum*, the fact that these new specimens are *B. minutifolium* is not an insurmountable difficulty, since these two species, if not indentical are at any rate very closely allied, and it is therefore quite probable that both had the same method of shedding. W. B. Turrill (Kew).

Oliver, F. W., Foreign pollen in fossil seeds. (New Phytologist. XIV. 6 and 7. p. 220—221. June and July 1915.)

The author refers to Mr. Birbal Sahni's paper on the finding of foreign pollen in ovules of *Ginkgo* and states that it is exceedingly rare to find foreign pollen in the pollen-chambers of fossil seeds. Indeed *Stephanospermum akanioides* is the only instance in his experience in which it was possible to be sure of the presence of foreign pollen.

Prof. Oliver remarks on the abundance of pollen frequently found in the pollen-chambers of fossil seeds and that *Physotoma elegans* is pre-eminent in this respect. The following possibilities as to the circumstances which brought so much pure pollen into the pollen-chambers are suggested: in the event of aerial transport

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Die Unterschiede gegenüber den Stammeltern und A. Degenii Seym. sind angeben. — Matouschek.]

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XIX. Pflanzenchemie.

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Cf. **VI. Atwood; Sprecher.**

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Piper, C. V. and **W. J. Morse. 1915.** The bonavist, lablab, or hyacinth bean. (Bull. U. S. Dep. Agr. 1915. 318.) [Referring to Dolichos Lablab. — Trelease]

Poli, P. 1915. Akklimatisationsversuche mit japanischen Reissorten in Italien. (Int. agr.-techn. Rundschau. VI. p. 451—454.)

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Smits, M. B. 1915. Enkele bijzonderheden van de rijstcultuur ter Sumatra's Westkust. (Teysmannia. XXVI. p. 619—625.)

XXI. Biographie, Necrologie.

Mirande, M. 1915. Arvet-Touvet, botaniste Dauphinois et son oeuvre. (Ann. Univ. Grenoble. XXVII. p. 85—167.)

Rechinger, K. 1913. Nachruf für Michael Ferdinand Müllner. (Verh. k. k. zool.-bot. Ges. Wien. 1913. p. 231—234. 1 Portr.)

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either the drop mechanism remained in operation for a prolonged period or else the pollen was discharged into the air at no great distance in dense clouds. Otherwise, some such agency of transport as insects must have come into play.

The question of the validity of the presumption that pollen present in the pollen-chamber of a fossil seed really belongs to the plant is of importance as it is apt to lead to the correlation of detached microsporangia. The author thinks it is justifiable to continue to draw the usual inference seeing that the pollen found is nearly always pure. W. B. Turrill (Kew).

Scott, D. H. and **E. C. Jeffrey.** On fossil plants showing structure, from the base of the Waverley Shale of Kentucky. (Phil. Trans. Roy. Soc. Lond. CCV. p. 315—373. 1914.)

The material on which the present memoir was based was obtained by Prof. Charles Eastman and Mr. Moritz Fischer at a locality about one mile west of Junction City in Boyle County, Kentucky. The nodule layer is a well marked stratum 20 to 24 inches thick, lying at the base of the Waverley (Lower Carboniferous) and immediately above the Genessee Black Shale of Upper Devonian age.

Six plants belonging to six genera are described, and all the species and two of the genera are new to science.

Calamopitys americana has the following important characters: the pith is mixed, containing tracheides in all parts, there are paired leaf-trace bundles in the wood, and there is considerable development of secondary tissue around the leaf-trace bundles, extending to the inner as well as the outer surface. Accompanying this *Calamopitys* is a *Kalymma* which probably belongs to it as the petiole.

Calamopteris Hippocrepis is a very characteristic petiole, no doubt allied to *Kalymma*. The vascular system of the petiole forms a horse-shoe with a marked invagination at the bend; the lateral bundles form continuous bands; the bundles are collateral and the xylem mesarch.

Periastrum perforatum was probably a petiole. The symmetry is bilateral; the vascular bundles are confined to a straight median row; the cortical tissue on either side of the median band is perforated by numerous lacunae.

Stereopteris annularia (gen. et sp. nov.) was probably the petiole of a fern, and finds its place among the *Primofilices* of Arber (*Coenopterideae* of Seward), and on the imperfect evidence available appears to stand nearest to the *Zygopterideae*. The petiole is somewhat elliptical in transverse section and traversed by a single bundle; the xylem plate is enlarged at the middle and at the two ends, is slightly curved and consists of a solid mass of scalariform tracheides.

Archaeopitys Eastmanii (gen. et sp. nov.) represents a new type of stem belonging to the family *Pityeae*. The pith is continuous, not discoid and is traversed in all parts by mesarch strands of primary xylem; circum-medullary xylem-strands, also mesarch, are present at the inner edge of the wood; the medullary strands pass outwards one by one each fusing with a circum-medullary strand; new strands appear in the pith to replace those which have passed outwards. The secondary wood is of a Cordaitean character,

consisting of small tracheides with two or three rows of pits and of medullary rays, both multiseriate and uniseriate but of no great height.

Lepidostrobus Fischeri (since re-named *L. kentuckiensis,* Scott) is a large cone of the same general type as the well-known *L. Brownii.*

The species described fall into three categories:

1. Fossils of the same type as certain of Unger's Saalfeld plants: *Calamopitys americana* (and its *Kalymma*), *Calamopteris Hippocrepis, Periastrum perforatum.*

2. Fossils of altogether new genera: *Stereopteris annularis, Archaeopitys Eastmanii.*

3. A fossil of a familiar Lower Carboniferous type: *Lepidostrobus Fischeri* (= *L. kentuckiensis*).

The fossils under the first of these headings are sufficient to establish a close relation between the Kentucky flora, as given above, and that of the Thuringian beds described by Unger. The two new genera enhance the peculiar character of the Kentucky group of fossils. The *Lepidostrobus* is the type of fossil to be expected from a Lower Carboniferous horizon.

The authors conclude that the evidence of the Kentucky plants, collectively, appears to be in harmony with a position at the base of the Lower Carboniferous, but, taken by itself, it would not be inconsistant with a greater antiquity, going back to the Upper Devonian. W. B. Turrill (Kew).

Scott, D. H., *Lepidostrobus kentuckiensis,* nomen nov., formerly *Lepidostrobus Fischeri,* Scott and Jeffrey: a correction. (Proc. Roy. Soc. LXXXVIII. p. 435—436. 1915.)

In a paper by the author and Prof. Jeffrey published in the Phil. Trans. R. Soc. 1914 a new species of *Lepidostrobus* was described from the Waverley Shale of Kentucky under the name, *L. Fischeri.* It is now admitted that this name is not available, another fossil cone having been described in 1890 by M. B. Renault, under the same name, *L. Fischeri.* The name *L. kentuckiensis* is now proposed for the Kentucky plant. W. B. Turrill (Kew).

Stopes, M. C., The "fern ledges" Carboniferous flora of St. John New Brunswick. (Mem. Canada Dept. Mines, Geolog. Survey, N⁰. 41. p. 142. 1914.)

The following plants are described or referred to in this work, many of them being represented by text-figures or plates:

Calamites Suckowi Brogn., *Calamites* sp., *Calamostachys* sp., *Asterophyllites acicularis* Dawson, *A. parvulus* Dawson, *Asterophyllites* sp., *Annularia sphenophylloides* Zenker, *A. stellata* Wood, *A. latifolia* Kidston, *Sphenophyllum antiquum* Dawson, *S.? cuneifolium* Zeiller, *Lepidodendron* sp., Lycopod foliage, *Lepidodendron* sp. in *"Bergia"* condition, *Sigillaria* sp., *Stigmaria ficoides* Brongn., *Psilophyton elegans* Dawson, *Sphenopteris marginata* Dawson, *S. valida,* Dawson, *Crossotheca Hoeninghausi* Brongn., *Diplothmema subfurcatum* Dawson, *Oligocarpia splendens* (Dawson) Stopes, *Pecopteris Miltoni* Artis, *P. plumosa* Artis, *Alethopterls lonchitica* Schloth., *Megalopteris Dawsoni* Hartt, *Adiantites obtusus* (Dawson) Stopes, *Neuropteris heterophylla* Brongn., *N. eriana* Dawson, *N. gigantea* Sternberg, *N. Selwyni* Dawson, *Neuropteris* sp., *Trigonocarpum perantiouum*

Dawson, *Rhacopteris Busseana* Stur, "fern" Aphlebiae: *Cyclopteris varia* Dawson, *C. Brownii* Dawson, and *Rhizomorpha lichenoides* Pteridosperm fructifications: *Sporangites acuminata* Dawson, and *Pterispermostrobus bifurcatus* gen. et sp. nov. *Whittleseya Dawsoniana* D. White, *W. concinna* Matthews, *Dicranophyllum glabrum* Dawson, *Cordaites Robbii* Dawson, *C. principalis* Germar, *Poacordaites* sp., *Dadoxylon Ouangondianum* Dawson, *Sternbergia* sp., *Cordaianthus devonicus* Dawson, *Cardiocarpon cornutum* Dawson, *C. obliquum,* Dawson, *C. ovale,* Dawson, *C. Baileyi* Dawson, *C. Crampii* Hartt.

A list, with notes, is given of those species which have been recorded from St. John but which are considered not to be really established.

It is concluded that the Fern Ledges represent plant debris from differing ecological situations which were all growing in that period of time in the Coal Measures which is best known as the Westphalian, and that probably it corresponds in point of time most nearly to the lowest zone of the middle Westphalian. The specific identity between so many of the plants from Europe and Canada is regarded as a point of great interest in relation to the geographical distribution of the forms.

As regards the composition of the flora, a point immediately noticeable is the scarcity of *Sigillaria* and *Lepidodendron*. This is all the more remarkable because in some beds *Calamites*-remains are common, so that all members of the "swamp-flora" are not absent. There is also a scarcity of *Sphenophyllum,* another of the typical swamp-growing forms of the Coal Measures, and it is taken that the flora is not a typical mixed one of the Coal Measures but one principally growing on dry land. The beds of *Calamites* alternating with others of mixed debris indicate that there were groves of *Calamites* growing as an almost "pure formation" just as modern *Equisetum* does to-day. The absence of *Mariopteris* is remarkable in a flora containing so many other typical Westphalian "ferns".

W. B. Turrill (Kew).

Ewart, A. J., On Bitter Pit and Sensitivity to Poisons. 3rd Paper. (Proc. Roy. Soc. Victoria. XXVI. 2. p. 226—242. 1 pl.)

In the first part of this paper, which is in continuance of his former articles, the author gives the result of some experiments comparing potatoes with apples with regard to their sensitivity to poisons. In all cases potatoes were found to be less sensitive than apples.

The author goes on to critise the results obtained by Rothera and Greenwood, tending to show that bitter pit tissue contains no poison capable of inhibiting diastatic action. In the presence of tanic acid starch is precipitated in a form which is very resistant to diastase, and moreover in such a case a small quantity of starch may not be detected by the iodine test. It is suggested that the results obtained are due to these facts having been overlooked.

An exhaustive analysis of the mineral constituents of bitter pit tissue is required. E. M. Wakefield (Kew).

Brand, A., Hydrophyllaceae. (Engler's Pflanzenreich. LIX. 210 pp. Fig. im Texte. Leipzig, W. Engelmann. 1913.)

Die starke Behaarung, fast allen *Hydrophyllaceen* eigen, findet

sich schon in der jungen Keimpflanze angelegt, ja es tritt sogar eine doppelte Behaarung auf, z. B. bei *Phacelia magellanica*, kurzere Drüsenhaare und längere steife drüsenlose Haare. Die Keimblätter sind mitunter sogar schon behaart, wenn sie noch im Samen liegen. Beim Weiterwachsen der Keimlinge treten schon zwei Typen auf: I. Die Entwicklung des Stengels erfolgt langsam; zwischen Keimblatt und den ersten Laubblättern ist ein sehr kurzes Internodium (z. B. *Nemophila Menziesii, Phacelia magellanica*). II. Schnelles Wachstum des Stengels; langes Internodium (z. B. *Nemophila parviflora*, viele Arten von *Phacelia*). Bei den einjährigen, auf trockenem Boden wachsenden *Phacelia*-Arten erfolgt die Keimung 4—6 Tage nach der Aussaat, bei den ausdauernden oder 2-jährigen liegen die Samen 9—14 Tage in der Erde. *P. Purshii* keimte erst nach 16 Tagen. Samen von *Hydrolea spinosa* entwickelen sich nur unter Wasser, nach 14 Tagen. — Das winzigste Pflänzlein ist *Phacelia orogenes* (2 mm langer Stengel); *Wigandia* erreicht 4 m Höhe. Stengellos sind *Hesperochiron, Phacelia acaulis*. Kletternd ist *Nemophila aurita*. Schlepegrell's System, begründet auf anatomische Merkmale, ist sehr praktisch. Eigene Beobachtungen stellte der Verf. über die Bestäubung von *Nemophila*-Artenen (Bienenpflanzen). Die *Hydrophyllaceen* sind über alle Erdteile mit Ausnahme von Europa und Australien verbreitet. *Hydrolea zeylanica* in Queensland ist eingeschleppt, ebenso *Phacelia tanacetifolia* in Europa eingeführt. *Nama sandvicense* unterscheidet sich von den mexikanischen Verwandten morphologisch sehr weinig, obwohl sie auf den Sandwichinseln vorkommt. In Asien gibt es nur *Hydrolea zeylanica* und *Romanzoffia unalaschkensis*, denn die japanische Gattung *Ellisiophyllum* ist eine *Scrophulariacee*. In Afrika gibt es 6 Arten. Etwa 200 Arten bewohnen Amerika; *Codon* kommt hier nicht vor. Verf. stellt die *Hydrophyllaceen* in die Mitte zwischen den *Polemoniaceen* und den *Borragineen*.

Das System ist:

I. **Hydrophyllae**, mit den Gattungen *Hydrophyllum* L., *Decimium* Raf., *Ellisia* L., *Nemophila* Nutt.

II. **Phacelieae** A. Gray mit den Gattungen *Draperia* Gray, *Phacelia* Juss., *Miltitzia* A. DC., *Emmenanthe* Bth., *Wigandia* H. B. K., *Lemmonia* A. Gray, *Eriodictyon* Bth., *Nama* L., *Andropus* Brand, *Tricardia* Torr., *Hesperochiron* S. W., *Romanzoffia* Cham., *Codon* L.

III. **Hydroleae** Choisy mit dem Genus: *Hydrolea* L. [Sect. 1. *Attallaria* Brand, Sect. 2. *Sagonea* (Aubl.) Brand].

Matouschek (Wien).

Cheeseman, T. F., Description of a new *Celmisia*. (Trans. New Zealand Institute. XLVI. p. 21. 1913.)

The new species described, *Celmisia morgani*, is most closely allied to *C. longifolia*, Cass. var. *graminifolia*, T. Kirk, but differs in having larger, broader and thinner leaves. It was collected on the South Island, between Westport and the Ngakawan River.

E. M. Jesson.

Cheeseman, T. F., New species of flowering plants. (Trans. New Zealand Institute. XLVII. p. 45—47. 1914.)

Ligustrum capillifolium (S. Island: Mountains of S. W. Otago), *Pterostylis Matthewsii* (U. Island: Mangonui County), *P. trullifolia* (U. Island: Vicinity of Auckland, Waitakarei and Huneca Ranges), *Microlaena Carsei* (U. Island: Mangonui County).

E. M. Jesson.

Cheeseman, F. T., Notes on *Aciphylla* with descriptions of new species. (Trans. New Zealand Institute. XLVII. p. 39—44. 1914.)

The history of the genus and its various species is discussed and descriptions given of the following: *A. indurata, A. similis, A. multisecta, A. congesta.* E. M. Jesson.

Cockayne, L., An undescribed species of Cotula from the Chatham Islands. (Trans. New Zealand Institute. XLVII. p. 119. 1914.)

Cotula Renwickii is described from the cliffs of the small islands known as the Forty Fours. It is closely related to *C. Featherstonii,* but easily recognized by its greater stature, it stems ringed with old leaf-scars, thin glabrous leaves and much larger flower heads.

E. M. Jesson.

Cockayne, L., Some new species of New Zealand flowering plants. (Trans. New Zealand Institute. XLVII. p. 111—118. 1914.)

Urtica linearifolia (Hook. f.) Cockayne sp. nov., (= *U. incisa,* Poir. var. *linearifolia,* Hook. f.), *Pittosporum divaricatum, Carmichaelia paludosa, Gentiana serotina, Owrisia Crosbyi, Wahlenbergia Matthewsii, Celmisia angustifolia, C. Hookeri, Helichrysum* (?) *dimorphum, Cotula Dendyi, Senecio southlandicus.* E. M. Jesson.

Cohn, F. M., Beiträge zur Kenntnis der *Chenopodiaceen.* (Flora, CVI. (N. F. VI.) p. 51—89. 27 Textfig. 1913.)

Die typische Blüte der *Chenopodiaceen* ist die nach der 5-Zahl in allen Wirteln gebaute; alle übrigen lassen sich aus dieser ableiten bei Berücksichtigung des Gesetzes der gleichmässigen Verteilung in dem zur Verfügung stehenden Raume. Eichler's Erklärung jeder einzelnen Blütenform ist eine zu künstliche. Die Reduktion der Fruchtblätter geht bis zur Zahl 2. Perigon und Androeceum können sogar verschwinden, die Perigonblätter zeigen sich im allgemeinen widerstandsfähiger als die Staubblätter. Eine im Text beschriebene eigenartig ausgebildete Blüte liesse sich vielleicht als Stütze der Wettstein'schen Theorie über die Entstehung der Angiospermenblüte verwenden. Bei *Corispermum* kommen ausser den gewöhnlich radiären Blüten auch nach der 5-zahl dorsiventral gebaute vor, die aber auch bis zum Schwinden der Perigon- und Staubblätter (hier sind die Staubblätter widerstandsfähiger) reduziert werden können. Goebel's Theorie der gepaarten Blattanlagen findet in den Stellungsverhältnissen der *Chenopodiaceen*blüte eine Stütze; einige Diagramme Eichler's die dagegen sprechen, beruhen auf Irrtum. Bei *Atriplex hortensis* sind die verschiedenen Fruchtformen wesentlich durch Ernährung bedingt, wie Experimente am Schlusse der Arbeit bestätigen, indessen, um ganz sicher zu gehen, muss in dieser Richtung noch weiter untersucht werden. Bei dieser Art existiert für alle Fruchtformen eine gemeinsame Anlage bis zu einem bestimmten Stadium (plastisches Stadium), von dem aus, wesentlich durch die Ernährung bedingt, die endgültige Fruchtform sich entwickelt. Durch Ernährungswechsel im plastischen Stadium entstehen Zwischenformen, die den Uebergang von den gelben zu

den schwarzen Früchten vermitteln. Die Keimung der schwarzen Samen ist eine ganz andere, ob sie auf Fliesspapier oder Sand geschieht, oder im Freien in der Erde. In dieser keimen sie viel langsamer und nur bei gewisser Feuchtigkeit und Wärme

. Matouschek (Wien).

Domin, K., Sixth Contribution to the Flora of Australia. (Repertor. spec. nov. XII. p. 95 - 99.)

Domin, K., Seventh Contribution to the Flora of Australia. (Ibidem. p. 130—133.)

New Species are described: *Myosporum latisepalum* Domin n. sp. (Sectio *Chamaepogonia, M. debili* affine,; *Notelaea longifolia* Vent. n. var. *decomposita* et n. var. *pedicellaris; Alyxia buxifolia* R. Br. n. var. *subacuta; Ervatamia* (*Tabernaemontana*) *pubescens* (R. Br.) n. var. *loniceroides,* n. var. *grandifolia,* n. var. *superba, Ervatamia* (*Tab.*) *Daemeliana Ervatamia* (*Tab.*) *Benthamiana, Ervatamia* (*Tab.*) *angustisepala* (ab *Erv. orientali* habitu, foliarum forma recedit ab *Erv. Benthamianum*), *Anisomeles salviifolia* R. Br. n. var. *denudata; Monotoca Baileyana* (affinis *M. lineatae*); *Solanum simile* F. v. M. n. var. *capsiciforme* (baccis globosis) n. var. *fastigiatum* (F. v. M. als sp. nov.; baccis ovoideis sed latitudine vix duplo longioribus), *Solanum lucorum* ((*S. stelligero* valde affinis), *S. accedens* (praecedente plantae affine), *S. curvicusque* (*S. violaceo* R. Br. affine) cum nova forma *curvispina, S. Mitschellianum* valde affine *Solano semiarmato*); *Agapetes queenslandica* affinis *A. Meinianae*); *Zieria laxiflora* (affinis *Z. laevigatae*) cum forma *Fraseri* [Hooker sub species]; *Phebalium woombye* Domin nov. comb. [= *Asterolasia woombye* Bail); *Jussiaea repens* L. n. f. *brevipes* et n. f. *longipes; Prema Dallachyana* Benth. n. var. *obtusisepala, Rubus Moorei* F. v. M. n. var. *Leichhardtianus.*

Matouschek Wien).

Duthie, J. F., Flora of the Upper Gangetic Plain. (III 1. Calcutta Government Printing. 1915.)

One new combination is recorded in the above work, namely *Neolitsea lanuginosa* Duthie (= *Tetradenia lanuginosa*).

E. M. Jesson.

Engler, A. und **K. Krause.** Sapotaceae africanae. (Bot. Jahrb. IL. p. 381—398. 2 Textfig. 1913.)

Es werden als neu lateinisch beschrieben: *Omphalocarpum Mildbraedii* (verwandt mit *O. ogouense* Pierre, Früchte aber gleichmässig kugelig und grösser; S.-Kamerun; Abbildung), *Omphalocarpum Friederici* (erheblich kleinere Blätter als die anderen Arten; ebenda); *Sersalisia Ledermannii* (durch anders gestaltete Blätter und kleinere Blüten von *S. disaco* und *S. cerasifera* verschieden; Kamerun), *Sersalisia Chevalieri* Engl. (Ober Guinea); *Pachystela liberica* Engl. (Liberia; verwandt mit *P. cinerea,* oben kleinere Blätter und völlig kahl), *Pachystela robusta* (Blatt unten abgerundet, Blüten grösser als bei den anderen Arten; Kamerun), *P. achystela Gossweileri* Engl. (kleine schmale Blätter, spärliche Blütenbüschel; Angola); *Chrysosplenium pentagonocarpum* (abgebildet; grosse 5-kantige Früchte, verwandt mit *Ch. Buchholzii;* S.-Kamerun), *Ch. Tessmannii* (breite, mehr zugespitzte Blatter, verwandt mit *Ch. uatalense;* Span.-Guinea), *Ch. africanum* A. DC. n var. *orientale* Engl. (folia basin versus magis angustata; guineensische Waldpro-

vinz und Usambara), *Ch. Holtzii* Engl. (verwandt mit *Ch. natalense;* zentralafrik. Zwischenseeland); *Mimusops Doeringii* (Togo), *M. dukensis* (Kamerun), *M. Adolfi Friederici* (dichte rostbraune Behaarung der Blütenstiele und Kelchblätter; unt. Kongogebiet), *M. ilendensis* Engl. (andere Nervatur; Kamerun), *M. kribensis* (ebenda; stark hervortretende Nervatur), *M. Mildbraedi* (S.-Kamerun), *M. dolensis* Engl. (langgestielte, grossen, aussen dicht hellrostbraun gefärbte Blüten; Kamerun), *M. Rudatisii* (verwandt mit *M. dispar,* Natal), *M. ebolowensis* (ganz kahl, kleine glänzende Blätter; S.-Kamerun), *M. ngembe* (zur untergattung *Lecomtedoxa* gehörend; Kamerun). Bei den neuen Arten ist dort als Autor Engler et Krause zu setzen, wo nicht ein anderer Autorname gesetzt wurde.

Matouschek (Wien).

Gilg, E., Drei neue Straücher aus Natal. (Nbl. d. kgl. bot. Gart. u. Mus. zu Berlin. V. p. 289—290. 1913.)

Erica Thodei Gilg n. sp. gehört zur Sekt. *Trigemma* und ist am nächsten verwandt mit *E. propinqua* Guthr. et Bol.; Natal.

Erica Straussiana Gilg n. sp., in der Sekt. *Lamprotis* stehend, hat Beziehungen zu *E. corifolia;* Natal.

Leucodendron natalense Thode et Gilg n. sp. ist die erste Art der Gattung, die aus Natal bekannt geworden ist. Sie ist verwandt mit *L. minus* Ph. et Hötch. und *L. lanigerum* Buck.

Matouschek (Wien).

Petrie, D., Descriptions of new native Phanerogams. (Trans. New Zealand Institute. XLVI. p. 32—39. 1913.)

The new species here described are: *Ranunculus Grahami, Epilobium antipodum, Celmisia semicordata, Wahlenbergia Morgani, Myosotis suavis, Carex Gibbsii, Deyeuxia glabra, Danthonia teretifolia, D. Buchanani* Hook. f. var. *tenuis* (var. nov.), *D. semiannularis,* R. Br. var. *nigricans* (var. nov.) *Poa Poppelwellii.* E. M. Jesson.

Petrie, D., Descriptions of new native Phanerogams, with other short notices. (Trans. New Zealand Institute. p. 48—59. 1914.)

Aciphylla Cuthbertiana (Fiord County), *A. Crosby-Smithii* (Fiord County), *A. cartilaginea* (Stewart Island), *Celmisia glabrescens* (Stewart Island), *C. Poppelwellii* (Eyre Mts.), *Abrotanella filiformis* (Stewart Island), *A. Christenseni* (Hammer Plains). *Veronica cassinioides* (Takitimu Mts.), *Euphrasia integrifolia* (Fiord Connty), *Atriplex Buchanani,* T. Kirk, var. *tenuicaulis* (var. nov.), Centre Island), *Uncinia uncinata* (L. f.) Kükenth., var. *pedicellata* (Kükenth.) Petrie, (var. nov. *U. strictissima* (Kükenth.) Petrie (comb. nov.) = *U. rigida,* Petrie (Amuri County to Stewart Island etc.), *Carex chatamica* Chatham Islands), *C. kermadecensis* (Sunday Island), *Calamagrostis* (*Deyeuxia*) *Youngii* (Hook. f.) Cheesm. var. *Petriei,* (comb. nov.) = *Deyeuxia Petriei* of Cheesman's "Manual of the New Zealand Flora" (= *Calamagrostis Petriei,* Hackel), *Poa Colensoi* Hook. f. var. *brevi ligulata* (var. nov.), *P. caespitosa,* Forst. f. var., *planifolia* (var. nov.) (Antipodes Island). In conclusion, notes on *Corallospartium crassicaule* (Hook. f.) Armstrong and *Myosotis* (*Exarrhena*) *Lyalli* Hook f. are given. E. M. Jesson.

Petrie, D., On the occurrence of *Poa antipoda,* Petrie on Herekopere Island. (Trans. New Zealand Institute. XLVI. p. 39. 1913.)

The occurrence of this grass on one of the main islands of New Zealand is a matter of considerable interest. It has been recorded previously only from the subantarctic islands. The author points out that the small islands off Stewart Island have now furnished a number of southern plants not found elsewhere outside the subantarctic area and he considers it highly desirable that these islands, and especially the Snares should be carefully explored.

E. M. Jesson.

Rydberg, P. A., Notes on *Rosaceae.* X. (Bull. Torrey Bot. Cl. XLII. p. 463—479. Aug. 1915.)

An analysis of the hybrids of *Rubus,* supplement to the treatment in „North American Flora", with citation of specimens held to represent the various hybrids therein described. Trelease.

Wildt, A., Weitere neue Standorte mährischer Pflanzen. (Verhandl. naturf. Ver. Brünn. LIII. 1914. p. 261—267. Brünn. 1915.)

Orobanche alsatica Kirsch. wurde bei Nikolsburg auf *Seseli glaucum* gefunden. — *Ornithogalum sphaerocarpum* Kern. (im Casop. mor. mus. zemsk. XIV. 417) rechnet Verf. entschieden zu *O. pyramidale* L.; die ebenda aufgestellte neue Form *Orn. Wildtii* ist nicht als neue Form aufzufassen, auch nicht als *Orn. Bungei* Boiss. (wie Verf. dies früher tat), sondern ist nach R. v. Wettstein ein *Orn. Boucheánum* Aschers. mit einer Rückbildung der Antheren. Die gesetzte Kultur der Pflanze bestätigt dies; die Unterschiede vom typischen *Orn. Boucheánum* weichen immer mehr zurück und fast nur die Unfruchtbarkeit der Pflanze blieb erhalten. — *Anchusa officinalis* L. erscheint bei Brünn in eine durch die Eisenbahn eingeschleppten Form, die habituell und durch schwächere Behaarung an die im Banate vorkommende *A. ochroleuca* M. B. erinnert, und von der blau blühenden Form der letzteren nur durch die an den Kelchzipfeln fehlende, häutige Berandung abweicht. — *Pulsatilla vulgaris* Mill. ist im botanischen Garten in Olmütz gezogen; die Pflanze ist *P. grandis,* welche durch Kultur in erstere übergeführt wurde. — *Euphorbia pinifolia* Lam. ist für ganz Mähren neu (Eisgrub). — Die meisten Exemplare von *Lycopodium chamaecyparissias* A. Br. aus Mähren nähern sich dem *L. anceps* Wallr.; doch fand Verf. auch typische Stücke. — Sonst mehrere seltenere Arten und Hybride werden aufgezählt. Matouschek (Wien).

Personalnachrichten.

Privatdozent Dr. **W. Bally,** bisher in Bonn, siedelte an die Universität Basel (Schweiz) über. — Dr. **Hans Burgeff** hat sich für Botanik an die Universität München habilitirt.

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